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SYSTEMATIC REVIEW

Identification of the core characteristics of observer reactions to facial prosthetics on/in people following head cancer or traumatic injury: A systematic review

Caroline A. Reed, MSc[1]*, Sam Harding, PhD[2], Jonathan San Diego, PhD[3], Trevor Coward, PhD[4]

[1]Maxillofacial Prosthetics, Academic Centre of Reconstructive Science, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom.
[2]Research and Development, North Bristol NHS Trust, Bristol, United Kingdom.
[3]Centre for Dental Education, Faculty of Dentistry, King's College London, London, United Kingdom.
[4]Academic Centre of Reconstructive Science, King's College London, London, United Kingdom.

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Corresponding Author:

Ms. Caroline A. Reed

Academic Centre of Reconstructive Science
Maxillofacial Prosthetics
Floor 20, Tower Wing
Guy's and St Thomas' NHS Foundation Trust
Great Maze Pond
London
SE1 9RT

Phone: 020 7188 1864
Email: creed1@nhs.net

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ABSTRACT

Purpose: A person's face reflects personality, identity and emotions, is often the most visible part of the body and is of critical importance during interaction. Loss of a facial part following cancer surgery or trauma can leave a person with a significantly altered appearance. Rehabilitation may include provision of a facial prosthesis and, to make a fully informed decision, patients must understand how others may react to prostheses. This systematic review aims to investigate how facial prosthetics impact observer reactions.

Materials and methods: A comprehensive Mesh search string was conducted for OVID MEDLINE, APA PsycINFO, Cochrane Library, EMBASE, CINAHL and ERIC, including any image/interaction with any person wearing a facial prosthetic, real or edited (excluding intraoral); a control group/ internal controls must be stated. Narrative synthesis was planned due to the expected heterogeneity of outcome measures.

Results: The search identified 2663 titles, sixteen made it to full text review, all of which were excluded for not meeting the inclusion criteria.

Conclusions: This systematic review highlights a lack of information in this specific area of research that may be of great benefit to patients considering facial prostheses, clinicians treating these patients and support groups helping individuals cope with their changed appearance. (*Int J Maxillofac Prosthetics 2025;8:23-29*)

Keywords

Facial, Prosthetics, Reactions.

AUDIOABSTRACTACT

INTRODUCTION

A person's face is often the first focal point of attention during social encounters; it is generally the most visible part of the body and is of paramount importance to social interaction,[1-2] providing a person's identity,[3] expression of self,[3,4] and conveying a person's emotions,[5] and intellect.[3] Physical appearance is considered highly important in society,[6,7] and the increase in use of social media and image-based platforms since their introduction 26 years ago, has driven an increase in the importance of a person's appearance.[8,9] There are several study designs focusing on observer reactions to visible facial differences (VFD),[10] and it is well documented that unattractive people, and those with VFD, are often judged more negatively by others.[6,11,12] Research has shown that a VFD has a negative impact an individual's self-esteem,[13,14] and body image.[14,15]

Changing Faces, the UK's leading charity for people with visible differences, state that nearly one in five people in the UK self-identify as having a visible difference of the face or body, with 569,000 people in the UK having facial disfigurements.[16] One cohort of people with visible differences are those with loss of facial parts following disease, trauma or for congenital reasons.[14,17] Individuals with loss of a facial part, such as a nose, eye, or ear, may be provided with a prosthetic device to restore the missing facial feature. Literature shows that prosthetic devices have been in production for centuries, with continual advancements over this time.[18,19] In the UK,

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these devices are provided by maxillofacial prosthetists/ reconstructive scientists (hereafter referred to as the clinician). The Institute of Maxillofacial Prosthetists and Technologists (IMPT)[20] list 68 clinics in the UK offering these services, indicating many people living in the UK with a VFD, in need of this type of prosthetic rehabilitation; worldwide, this number is expected to be much larger. A paper published in 2010 surveyed 220 maxillofacial prosthetists in the UK, receiving only a 22% response rate they showed that 1193 prostheses had been manufactured that year, indicating that the actual number of prostheses manufactured in the UK in a single year would be much higher.[21]

It is well documented that when we view faces, we normally look at the central facial triangle, comprising the eyes, nose, and mouth.[4,22,23] When a VFD is closer to this central triangle it can be more impactful to observer reactions.[22-24] It is therefore important to understand the effect of wearing a facial prosthesis on observers in order to inform patients about how observers may respond to them. To date there are many patient-focused studies in the literature, that aim to understand a person's own feelings about their prosthesis.[25-29] However, these feelings are influenced by the responses they receive from other people. Reactions such as staring[28,29] and feelings of being judged have been described in patient-focused studies.[28] Without investigating the observers and the types or nature of reactions they have, it is unclear what the person wearing the prosthesis can expect. Having this information could give patients a more rounded awareness of expected responses in advance of social encounters and enable them to psycho-socially prepare from an evidence-based perspective. It could also arm the clinician with knowledge to inform their patients, researchers, and support groups. It is the aim of this systematic review to identify and synthesise reactions of observers to facial prostheses.

MATERIALS AND METHODS

The review followed recommendations by the Preferred Reporting Items for Systematic Review and Meta-Analyses Statement (PRISMA).[30] The protocol was registered in the Prospero Database (registration number CRD42023389229) and can be accessed via the international prospective register of systematic reviews.

Eligibility

In line with the Joanna Briggs Institute (JBI) guidance for systematic reviews, the eligibility for inclusion in the review was undertaken using the concepts of population, intervention, comparator/ condition, and outcome framework.[31]

The literature was examined to identify the core characteristics of reactions recorded towards facial prostheses and the techniques used to judge reactions.

Population

The aim of this review is to identify the core characteristics of people's reactions to people with a VFD resulting from cancer or trauma, and as such the population of interest for this study are humans. The population has not been limited further than this to attempt to be as inclusive as possible.

Intervention

Images of (still, video or computer generated), or personal interaction with, a person who is wearing a facial prosthetic/prosthesis, to include real (actual patients with prostheses) or fabricated (digitally created images or make-up applied), but to exclude any intra-oral prostheses such as dental implants or obturators. Prostheses included in the review consist of orbital prostheses, ocular prostheses, nasal prostheses (partial or complete), auricular prostheses (partial, single, or bi-lateral), cheek prostheses and any other external facial contour prostheses. Any condition (colour, age, and quality) of prosthetic will be included. However, commenting of differing conditions of the prostheses included is not the aim of the review and will only be mentioned in context of synthesizing the data.

Comparison/Control

Studies included need to have a control group or an internal control e.g., multiple baseline or crossover design. The control groups might also be a control for images being viewed by the participants, such that an image may show a person with a facial difference wearing a prosthetic and, in another image, the same person without the prothesis.

Outcome

Data on the characteristics of reactions to facial prostheses, or differences between control and intervention will be classified as an outcome. Any reactions reported to facial prosthetics will be included. The collation and comparison of the techniques will be used to judge reactions.

Other measurements reported within retained papers such as personality inventories (e.g., State-Trait Personality Inventory, or Rotter's Locus of Control) will also be collected, as they may provide context or theory to inform data synthesis. However, they were not factors incorporated into the search strategies in order to maximise the breadth of the field of enquiry.

Study Design

Eligible studies include those reporting an empirical evaluation of the effectiveness of an intervention. To ensure all relevant literature is retrieved, a range of study designs will be included. These include randomised control trials (RCTs), experimental and quasi-experimental studies, within subject designs, cohort studies and case studies.

Search Methods

Following JBI protocol development guidance, an initial limited search of two databases was conducted prior to the full search being carried out.[31] A set of key terms was developed by the first author (CR), in consultation with co-authors who are subject experts with significant postdoctoral research experience in the area (SH, TC). These terms were then used for the initial limited search of Ovid Medline and Ovid Embase to trial and refine search terms. Working with a clinical librarian a full search strategy was finalized (Supplementary Material 1, available online). This search strategy was then adapted for each database; Cochrane Database, APA PsycINFO, EMBASE, CINAHL and ERIC. The searches were performed in May 2025 and had no earliest date limit.

Data Collection

All identified citations were collated and uploaded into EndNote(TM) and duplicates removed. The remaining citations were then downloaded and entered into the online review management software, Rayyan.ai. Two authors (CR and SH) independently excluded studies which were clearly unrelated to the review from their title. Inclusion and exclusion criteria (Table 1) are presented. The authors achieved 100% agreement in this process and then independently reviewed all the remaining abstracts against the stated inclusion criteria with 100% consensus achieved. Once all abstracts had been reviewed, potentially relevant sources for full text review were retrieved. The same authors examined all remaining papers independently at full text level with regular consensus meetings. The references of each of the papers included at full text review were screened for additional studies. The numbers of references considered at each stage are presented in the PRISMA flow chart (Fig. 1).

Quality Assessment

The Quality of the Methodology for the eligible studies was evaluated using the JBI Checklist family of tools.[31] With the appropriate tool being used dependant on the on the study design. Independent evaluation of quality was undertaken by two reviewers (CR and SH) and consensus reached jointly.

Data Synthesis and Analysis

Due to expected heterogeneity in outcome measures no meta-analysis of quantitative data was planned. Therefore, a narrative synthesis of included studies was planned assessing core characteristics of population characteristics, interventions utilised and outcomes.

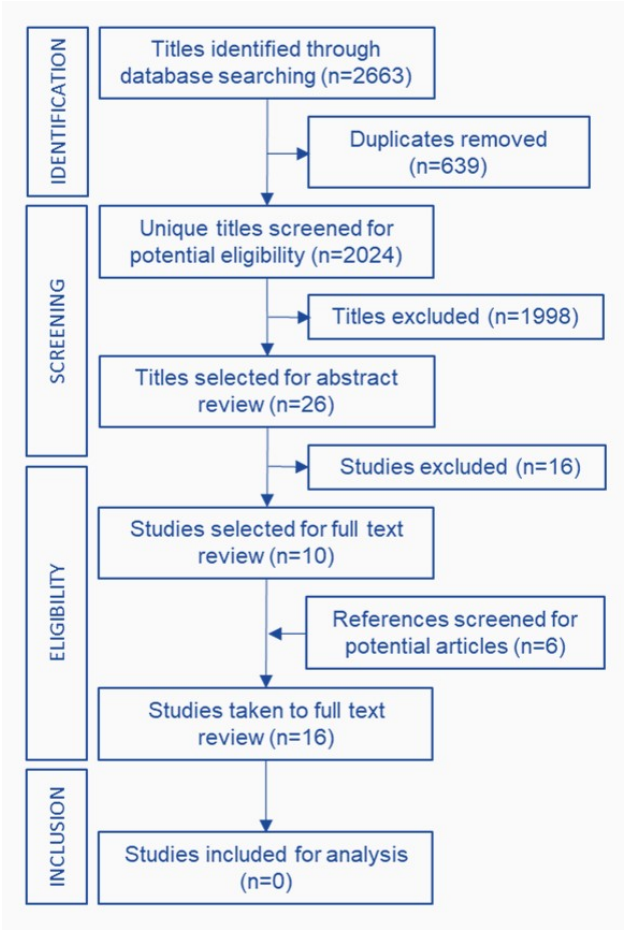
IDENTIFICATION
Titles identified through database searching (n=2663)
Duplicates removed (n=639)
SCREENING
Unique titles screened for potential eligibility (n=2024)
Titles excluded (n=1998)
Titles selected for abstract review (n=26)
ELIGIBILITY
Studies excluded (n=16)
Studies selected for full text review (n=10)
References screened for potential articles (n=6)
Studies taken to full text review (n=16)
INCLUSION
Studies included for analysis (n=0)

Fig 1. PRISMA flow chart. PRISMA, preferred reporting items for systematic review and meta-analysis.

RESULTS

From the database searches, 2663 titles were identified. After the removal of duplicates, 2024 unique titles remained. Following screening of the titles, 26 studies were selected for abstract review, after which, 10 were taken to full text review. The references of all papers (n=10) taken to full text review were assessed for relevant studies, resulting in a further 6 papers being sourced and reviewed at this stage thereby giving a total of 16 papers (Fig. 1).

At full text review all 16 studies were excluded for inclusion in the review as they did not meet the inclusion and exclusion criteria (Table 2). Studies were excluded due to being either patient focused rather than data from a general population, letters or conference abstracts. Also of importance was that none of the studies identified looked at the reactions towards facial prosthetics from the viewpoint of the observer. The following details the steps the authors would have taken if relevant studies had been identified.

Table 1. Study inclusion and exclusion criteria.

	Inclusion	Exclusion
Population	Any age, gender, ethnicity, location. Human participants.	Animal studies. People with visual impairments.
Intervention	Images (still, video, computer generated) or real personal interaction with a person wearing a facial prosthesis; orbital, nasal, auricular, cheek or other facial contour.	Intra-oral prostheses.
Comparison	Control group or internal control. Control group of images; no VFD's.	No control group or internal control.
Outcome	Any reaction recorded including eye tracking (gaze, fixations, avoidance), questionnaires, assumptions made, opinions of, stereotypes, avoidance/proximity, attention, physiological responses (heartrate, neural responses, sweating).	None to be excluded.
Setting	Any study setting to be included	None excluded.
Study design	Randomised controlled trials (RCT's), experimental and quasi-experimental studies, within subject designs, cohort studies and case studies.	None excluded.
Other	Full text available. English text available. Peer reviewed journal articles.	Not available in full text or English text. Grey literature, websites, blogs, conference presentations, abstracts and dissertation.

Table 2A. Fifteen articles taken to full text review and reason for exclusion (first 7 articles).

Paper Title	Reason for exclusion
Chigurupati R. Quality of life after maxillectomy and prosthetic rehabilitation. J Oral Maxillofac Surg. 2011;69:e-104.	Conference abstract
Connelly FJ. Ocular Prosthetics. The New Outlook 1969:280-3.	Letter
Newton TJ, Fisk J, Foote O, Frances C, Loh IM. Radford DR. Preliminary study of the impact of loss of part of the face and its prosthetic restoration. J Prosthet Dent. 1999:82;585-90.	Patient focused
Jordan-Ribeiro D, Carvalho LML, Viela R, Rocha DD, Lopes Ruas P, Perreira Avila A, et al. Development of esthetic prosthesis for a patient with severe stigmatizing facial lesions due to cancer: A pilot study. Support Care Cancer 2018:26;2941-2944.	Patient focused
Worrell E, Worrell L, Bisase B. Care of long-term survivors of head and neck cancer after treatment with oral or facial prostheses, or both. J Oral MaxFac Surg 2017:15;685-90.	Patient focused
Flood TR, Russell K. Reconstruction of nasal defects with implant-retained nasal prostheses. Br J Oral Maxfac Surg 1998:36;241-5.	Patient focused
Gillis RE, Swenson WM, Laney WR. Psychological factors involved in maxillofacial prosthetics. J Prosthet Dent. 1979:41;183-8.	Patient focused

Analysis

Following the convention of 'empty review' we will report the steps that would have been taken if any study had met the inclusion criteria. The reviewers would have extracted data, analysed the papers and synthesised the data as follows.

The characteristics of the studies authorship would have been extracted including the year of publication and the country in which the research was undertaken. Following this, participants would be described, including the number of participants, age ranges, gender and any other demographic presented within the retained papers. Participant numbers would also be split where appropriate into groups e.g., control vs., intervention group. The methodologies of each study would be recorded, along with data collection methods and explicitly tool, scales, or interventions used. For example, eye tracking to observe gaze, questions to record explicit biases, implicit association tests to record implicit biases. Physiological responses such as heartbeat or brainwaves, or conversational recall, may also have been used within retained papers. In addition, the types of images, characteristics of the prosthesis (to include aetiology and if images were real or artificially created), how the images were displayed (physical copies, on a computer), if presented in colour or black and white, and how the reactions were recorded would also be extracted.

Due to expected heterogeneity of data a narrative synthesis would be undertaken. For example, consideration would be given as to whether the control image was a person without a prosthesis, with no visible differences, or included a person without a prosthesis but with the natural tissue remaining which the prosthesis would normally conceal. Alternatively, if the study design was such that images of the same person before and after surgery/trauma or used CAD to restore the facial appearance of the person with the prosthesis were used. The reactions recorded would be compared and contrasted with consideration given to what the variation in methods would have meant in relation to the interpretations made by the retained papers authors.

DISCUSSION

This systematic review aimed to identify people's reactions towards facial prostheses. The hope was to identify the core characteristics of reactions recorded towards facial prostheses and to understand the techniques used to judge reactions. However, after completing the paper identification process no eligible studies were found, resulting in what is called an 'empty review'.[32]

There is a rich history of facial prosthetics and a drive to continually improve the materials and processes used for the manufacture of these devices, as well as impact on wearing quality of life and activities of daily living.[18,19,25-27] The authors anticipated that the search

Table 2B. Fifteen articles taken to full text review and reason for exclusion (remaining 8 articles).

Paper Title	Reason for exclusion
Sela M, Lowental U, Israel J. Therapeutic effects of maxillofacial prostheses. Oral Surg. 1980:50;13-6.	Patient focused
Dixit S, Shetty P, Bhat GS. Ocular prosthesis in children – clinical report. Kathmandu University Medical Journal. 2005:3;81-3.	Patient focused
Rozen RD, Ordway DE, Curtis TA, Cantor R. Psychosocial aspects of maxillofacial rehabilitation. Part I. The effect of primary cancer treatment. J Prosthet Dent. 1972:28;423-8.	Patient focused
Sykes BE, Curtis TA, Cantor R. Psychosocial aspects of maxillofacial rehabilitation. Part II. A long-range evaluation. J Prosthet Dent. 1972:28:540-5.	Patient focused
Jami RM, Schaaf NG. An evaluation of facial prostheses. J Prosthet Dent. 1978:39;546-550.	Patient focused
Bonanno A, Esmaeli B, Fingeret MC, Nelson DV, Weber RS. Social challenges of cancer patients with orbitofacial disfigurement. Ophthal Plast Reconstr Surg. 2010:26;18-22.	Patient focused
McGrouther DA. Facial disfigurement: The last bastion of discrimination. BMJ. 1997:314;991	Letter
Lowental U, Sela M. Evaluating cosmetic results in maxillofacial prosthetics. J Prosthet Dent. 1982:48;567-70.	Patient and clinician focused
Rivers JK, Bertucci V, Muhn C, Humphrey S, Solish N, Carruthers J, et al. Canada HARMONY study: Improvements in patient satisfaction with facial appearance and psychological impact of combined aesthetic treatment. Aesthetic Surgery Journal Open Forum 2025, ojae130.	Patient focused

for articles would result in several studies exploring how prostheses are viewed, and reacted to, by an observer. As this has not been the case the authors have considered possibilities for this.

It is important to critique the search strings used to elicit the references. On reviewing the process of search string development as well as the terms themselves, the authors believe that a sufficient range of search terms were included. Truncators and wildcards were included to increase the number of studies retrieved with six different databases searched to ensure a wide range of articles were retrieved, and that no study designs excluded. When compared to a scoping review conducted by Jewett et al in 2018, the current review used a wider range of terms for the types of reactions possible.[10] Jewett et al,[10] did include additional terms than those used in the current search strategy regarding the person's visible difference. However, these did not fit with the aim of the current systematic review; for example, the terms, 'physical difference*', 'exp physical disfigurement/', 'physical disabilities (attitudes toward)', 'disabled (attitudes toward)'.

It could be considered that the review question was too narrow.[32] The authors chose a focused and important question relating to a specific branch of healthcare, maxillofacial prosthetics, and if the question was expanded it would lose the aim of the review. For example, the authors could expand the question to look at reactions to all type of VFD, which might include acne, scarring, and birthmarks. However, this does not help to answer the question on how facial prosthetics are viewed, which would ultimately guide the clinician and the patient in their rehabilitation journey. A final possible explanation is that the question is not of significant importance. The authors would dispute this as, (i) there are many people in the UK alone that require facial prosthetics,[21] (ii) facial prosthetics have been in existence for a number of years and the processes and materials have continually been developed to improve appearance,[18,19] and (iii) there are a large number of patient reported studies revealing how the patient feels about their appearance or prosthesis, and the reactions they notice from the observer.[25-29]

The current question is of importance as it would (i) enable clinicians to discuss with their patients their treatment choices and implications of wearing a facial prosthesis, (ii) inform support groups and researchers, and (iii) identify the reactions that facial prosthetics elicit including the motivation behind the reactions, from an evidence-based perspective. This would allow the development of educational strategies and programmes for public education around prosthetics, thereby reducing any stigma that may exist around wearing a prosthesis.

In the current paper the authors aimed to identify and synthesise characteristics of reactions towards facial prostheses made by observers and identify the techniques used to judge reactions. While the authors present an empty review, it is important to report the findings as a potential gap in knowledge and understanding of facial prosthetics. While patients' feelings about their prosthesis are of importance in relation to the acceptance of a prosthesis, the types of reactions they may experience from others may have an impact on their social life and mental health. Without understanding what these observer reactions really are, a person is left to guess and assume, but ultimately have no evidence to challenge their own thoughts or behaviors and implement change. It would be reasonable to assume that a prosthetic might capture observer attention, if only out of curiosity or novelty. However, it is more difficult to predict the impact of a facial prosthetic on judgements made about the personality of an individual. As stated by Stone and Potton[3] when looking at reactions to general VFD; "the lack of empirical evidence of the actual emotions experienced by perceivers is unfortunate, as steps to reduce the problems experienced by people with facial disfigurement in social interaction can be beneficially informed by knowledge of the emotions that are normally invoked".[2]

CONCLUSION

Research is required to understand observer's response to facial prosthetics. Based on existing appearance related research (relating to cleft, birthmarks and other VFD) this could include reactions related to judgements made, attention and distraction from a task, eye tracking, physiological responses, and disgust. The information gained would help prepare patients during their rehabilitation through helping them to understand and prepare for the reactions they may encounter. Clinicians will be able to answer the question of how prostheses are generally received by onlookers. In turn this may assist with the decision-making process of whether to have a facial prosthetic or not. Lastly, support groups will have more information available to advise patients on observer responses and work on developing coping strategies to tackle reactions.

CONFLICTS OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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